BDCP Adaptive Management Decision- making: Tidal marsh restoration contributions to food web
DFG DRAFT
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Scientific Question or Uncertainty Related to CM 4: How does tidal marsh restoration affect production of food for covered fish and export of this food to suitable habitat?

Additional considerations:

1. What is the magnitude of food limitation vs. other stressors in limiting populations of covered fish species, particularly delta smelt? How do the effects of food limitation vary temporally and spatially?
2. How much new tidal marsh restoration is needed to boost the food web to achieve covered species recovery objectives?
3. Where does new tidal marsh habitat need to be created to be of greatest benefit?
4. Which restoration design criteria maximize food production and export of that production into adjacent waterways, and do these criteria vary with geographic location and with time?
5. How soon after initial site breaching are the benefits likely to be seen?
6. What other stressor reduction actions, and other conservation measures need to be implemented in conjunction with tidal marsh restoration in order to see food web benefits, e.g. exotic species control (especially clams), and contaminant reduction?
7. How can the food web benefits associated with any particular tidal marsh restoration site be identified in the context of other factors affecting the food web, including other habitat restoration actions in the system, changes in other stressors associated with other BDCP conservation measures, other stressor-reduction actions outside of BDCP, and other changes beyond management control? What is the optimum adaptive management experimental design given these constraints?

Adaptive management responses to observed outcomes:

Scale: Individual Restoration site at functional maturity

1. Phytoplankton / zooplankton targets are not achieved within Restoration Site A, and export targets from Site A are not achieved.

   Response:
   a. Identify the stressors or biotic/abiotic factors that are contributing to lack of creation and export.
   b. Implement actions to decrease stressors and increase creation and export, e.g. modify residence time, modify tidal exchange, control clams.
   c. Modify future restoration actions to reduce stressors and increase creation and export.
   d. Consider whether continuing restoration in this area, or at sites with similar constraints, is a worthwhile effort.
   e. Continue to experiment with creating restoration sites to achieve target outcomes in other areas.
   f. Evaluate whether to concentrate less on tidal marsh restoration and more on other CM's, including other types of habitat restoration, and decreasing other stressors on covered species.

2. Phytoplankton / zooplankton targets are achieved within Restoration Site A, but export targets from Site A are not achieved

   Response:
   a. Identify the stressors or biotic/abiotic factors that are contributing to lack of export.
   b. Implement actions to decrease stressors and increase export, e.g. modify residence time, modify tidal exchange, control clams.
   c. Modify future restoration actions to reduce stressors and increase export.
   d. Continue to implement restoration in areas most critical for rearing or localized support for other life stages.
   e. Consider whether continuing restoration in this area, or at sites with similar constraints, is a worthwhile effort.
   f. Continue to experiment with creating restoration sites to achieve target outcomes in other areas.

3. Phytoplankton / zooplankton targets are achieved within Restoration Site A, and export targets from Site A are achieved

   Response:
   a. Identify the biotic/abiotic factors that are contributing to success.
   b. Use this knowledge to design future restoration projects in this area and other areas.
   c. Continue to implement restoration in areas most critical for rearing or other life stages.
   d. Calculate the acreage of additional restoration needed to achieve objectives in this area. Once there is sufficient certainty that sufficient habitat is created in a particular area, no additional restoration in that area should be required.

To be developed

Scale: Entire ROA, e.g. Cache Slough

1. Phytoplankton / zooplankton targets are not achieved within ROA, and export targets from ROA are not achieved
2. Phytoplankton / zooplankton targets are achieved within ROA, but export targets from ROA are not achieved
3. Phytoplankton / zooplankton targets are achieved within ROA, and export targets from ROA are achieved